

Appl. No. 09/678,423

REMARKS

The Examiner is thanked for his careful review of this application. Claims 1-26 are pending after entry of the present Amendment. Amendments were made to claims 1, 2, 4, and 12 to clarify the claimed invention. New independent claims 25 and 26 were added. These amendments do not introduce any new matter.

Rejections under 35 U.S.C. § 112, second paragraph:

The Office has rejected claims 1-11 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. It is respectfully submitted that the Applicants have amended claims 1 and 2 to cure the lack of antecedent basis. Thus, it is respectfully requested that the 35 U.S.C. § 112, second paragraph rejections of claims 1-11 be withdrawn.

Objections to the Drawings:

The Office has objected to Figure 2A-1 for failing to comply with 37 CFR 1.84(p)(4). The Office objects to the reference character "214" designating both the drums and the wafer application region. Per the Office's request, the Applicants have corrected Figure 2A-1, implementing the reference character "214" to refer to the drums and the reference character "244" to refer to the wafer application region. Accordingly, it is respectfully requested that the 37 CFR 1.84(p)(4) objection to the drawings be withdrawn.

Rejections under 35 U.S.C. § 102:

The Office has rejected claims 1, 2, 11, 12, 14, and 16 under 35 U.S.C. 102(e) as being anticipated by the U.S. Patent No. 6,322,427 to Li et al. These rejections are respectfully traversed, as the Li reference fails to disclose each and every element of the claimed invention, as defined in amended independent claims 1 and 12.

As amended, independent claim 1 defines a polishing pad conditioner for use in a CMP apparatus. Among other features, the polishing pad conditioner for use in the CMP apparatus includes a fixed abrasive polishing pad having an abrasive polishing surface, a web dressing media, and a pressure application plate. The web dressing media has a contact surface defined between a first point and a second point where the first point is separate from the second point. The web dressing media is configured to be positioned over the fixed abrasive polishing pad such that the contact surface of the web dressing media is applied to

the abrasive polishing surface of the fixed abrasive polishing pad. The pressure application plate is applied against an application surface of the web dressing media that is an opposite surface to the contact surface and is defined between a first position and a second position.

Independent claim 12 defines a method for conditioning a polishing pad. The method includes providing a fixed abrasive polishing pad having an abrasive polishing surface and providing a web dressing media having a contact surface. The contact surface of the web dressing media is defined above the abrasive polishing surface of the fixed abrasive polishing pad. The method further includes applying the contact surface of the web dressing media to the abrasive polishing surface of the fixed abrasive polishing pad so as to dress the abrasive polishing surface of the fixed abrasive polishing pad.

In contrast, Li et al. disclose an apparatus and a method for conditioning a fixed abrasive article. Li et al. disclose a multi-station polishing apparatus that polishes a substrate using a polishing cartridge having a fixed abrasive polishing sheet or belt mounted on a rotatable, rectangular platen. Li et al. implement a corresponding pad conditioner to precondition/condition the fixed abrasive polishing pad of the polishing cartridge. The pad conditioner is shown to be a conventional pad conditioner apparatus having a conventional rotary pad conditioner mounted on a top of the table of a machine base. In a different embodiment, Li et al. disclose using the face to face frictional contact of the fixed abrasive pad to condition the working section of the polishing pad.

It is submitted that Li et al. fail to teach each and every feature of the claimed invention for several reasons. First, Li et al. fail to teach a web dressing media or a pressure application plate. Second, as Li et al. fail to disclose a contact surface defined between a first point and a second point where the first point is separate from the second point. Third, the Li et al. reference fails to teach a web dressing media that is positioned over the fixed abrasive polishing pad such that the contact surface of the web dressing media is applied to the abrasive polishing surface of the fixed abrasive polishing pad. Next, Li et al. do not disclose the pressure application plate that is applied against an application surface of the web dressing media. Li et al. also fail to teach an application surface of the web dressing media that is opposite surface to the contact surface and is defined between a first position and a second position. Accordingly, Li et al. fail to teach each and every element of independent claims 1 and 12.

Thus, amended independent claims 1 and 12 are respectfully submitted to be patentable under 35 U.S.C. § 102(e) over Li et al. In a like manner, dependent claims 2, 11, 14, and 16, 13, and 18-20 each of which directly or indirectly depends from the respective independent claim 1 and 12 are submitted to be patentable 35 U.S.C. § 102(e) over Li et al. for at least the reasons set forth above regarding the corresponding independent claim 1 and 12. As such, the Applicants respectfully request that the § 102(e) rejections be withdrawn.

Rejections under 35 U.S.C. § 103:

The Office has rejected claims 4, 5, and 13 under U.S.C. 103(a), as being unpatentable over Li et al. In a like manner, the Office has rejected claims 1-9 and 11-24 as being unpatentable under 35 U.S.C. 103(a) over U.S. Patent No. 6,312,319 to Donohue et al. in view of U.S. Patent No. 6,361,411 to Chopra et al. The Applicants respectfully traverse the Office's rejections and submit that independent claims 1, 12, and 19, as amended, are patentable over the cited references, as none of the cited references would have suggested the claimed invention to one of ordinary skill in the art.

Citing to Li et al., the Office asserts that Li et al. meet all the limitations of claims 1 and 12, except for disclosing the controlling of the applied pressure, i.e., stabilizer. The Office further asserts that it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to use a stabilizer as it was known in the art to control the pressure applied to the pad so as to enhance the dressing operation.

This assertion is respectfully traversed, as Li et al. do not meet all the limitations of the claimed invention. Independent claims 1 and 12 define using the pressure application plate to apply pressure to the application surface of the web dressing media causing the contact surface of the web dressing media to be applied onto the fixed abrasive polishing pad.

Li et al., on the other hand, do not disclose, teach, or suggest using a web dressing media to dress the fixed abrasive polishing pad. Li et al. use the conventional conditioning apparatuses as shown in Figure 3 in which a circular conditioner which rotates in a given direction is applied to the moving polishing pad. In contrast to the Office's assertion, Li et al. conditioner is not a web and does not include a web dressing media. Rather, Li et al. use a belt-type or a sheet fixed abrasive polishing pad, which is in the form of a web. This is different than the claimed invention in which a fixed abrasive polishing pad (which if desired, can be in the form of a web) is conditioned. In one embodiment, claim 19 defines the

conditioning by applying a web conditioning media that includes a feed roll and a take up roll to the fixed abrasive polishing pad.

Furthermore, the alleged stabilizer, the rectangular platen 100 of Li et al. is mounted on top of the table 23. Thus, in contrast to the Office's assertion, Li et al. would not have suggested using the platen as a stabilization member since one side of the platen is mounted on top of the table 23 and the other side is applied to the substrate to be prepared. As such, it would not have been obvious to one having ordinary skill in the art to use the platen as an stabilization member to arrive at the claimed invention.

Additionally, Li et al. fail to disclose, teach, or suggest using a pressure plate to apply the web dressing media to the fixed abrasive polishing pad, as claimed in independent claims 1 and 12. Rather, Li et al. disclose using a rectangular platen to support the polishing pad during the polishing operation and not to apply the conditioning medium to the polishing pad. Simply stated, the rectangular platen is not designed to apply the web dressing media to the polishing pad. Rather, it is used to support the fixed abrasive polishing pad while the carrier head is being applied thereon.

It must be noted that although the Office is correctly point out that Li et al includes a "web," the Li et al. web includes the polishing pad and not the conditioning media of the claimed invention. Thus, Li et al. do not disclose using a web dressing media to dress a fixed abrasive polishing pad by applying the contact surface of the web dressing media to the fixed abrasive polishing pad using the pressure plate. Furthermore, Li et al. do not disclose using the feed roll and take up roll to feed and receive the conditioning media as defined in claim 19. As such, Li et al. have not have suggested the claimed invention to one of ordinary skill in the art, as claimed in independent claims 1, 12, and 19.

It is respectfully submitted that independent claims 4, 5, and 13 which incorporate each and every element of the respective independent claim 1 and 12 are patentable under 35 U.S.C. § 103(a) over Li et al. are allowable for at least the same reasons discussed above.

In the same manner, citing to Donohue et al. and Chopra et al., the Office contends that Donohue et al. disclose a fixed abrasive polishing pad and a web dressing media having a contact surface, of the claimed invention. The Office further asserts that Donohue et al. fail to disclose a pressure application plate applied to the application surface of the polishing pad. However, the Office cites to Chopra et al., stating that it would have been obvious to one

having ordinary skill in the art to modify Donohue et al. with the pressure plate taught by Chopra et al. to enhance the conditioning operation.

The Applicants respectfully traverse the Office's contentions, as nothing in Donohue would have motivated one having ordinary skill in the art to implement a pressure plate to arrive at the claimed invention. Donohue et al. teach a polishing media magazine for polishing which includes a conditioning element. The conditioning element of Donohue et al. is taught to be a roller, a rotating brush, and a tensioned web or belt of conditioning media. The web or belt of conditioning media, as shown in Figure 16, implements a cylindrical roller to apply the conditioning media onto the polishing pad. Donohue et al. further teach a stand alone conditioning module that is configured to use the conditioning roller and spray bar. The conditioning system includes a conditioning head which may be in the form of a rolling element or a flat bar type element having surface geometry for conditioning the media or may be any non-contact conditioning system (e.g., ultrasonic, megasonic transducer, pressure water spray, etc.).

Turning to Chopra et al., a CMP apparatus that includes a downstream device for conditioning a web-shaped polishing pad is disclosed. Chopra et al. apply different conditioning treatments to different portions of the polishing pad using cylindrical roller segments that rotate at different speeds or cylindrical rollers that apply different pressures to different portions of the polishing pad. The CMP apparatus of Chopra et al. includes a fixed table 192 having a surface 194 for slidably supporting the back surface of the web-shaped pad.

Independent claim 19 defines a system for conditioning a pad that includes a pad conditioning media, a feed-roll containing a supply of the pad conditioning media, a take-up roll for receiving an end of the pad conditioning media, and a pressure application member. The pressure application member is defined between the feed-roll and the take-up roll and is configured to apply pressure onto the pad conditioning media as the pad conditioning media is applied against the pad to cause a conditioning of a surface of the pad.

Independent claims 1, 12, and 19, as amended, are patentable over Donohue et al. in view of Chopra et al. As acknowledged by the Office, Donohue et al. do not teach using of a pressure plate to apply pressure to the application surface of the web dressing media that is opposite surface of the contact surface. As shown in Figure 16 and 17 of Donohue et al., the conditioning element of Donohue et al. is shown to be a roller that remains stationary and is designed to condition the surface of the polishing pad, as the tensioned portion of the

polishing pad is brought into contact with the conditioning element with a given force. In this manner, Donohue et al. introduce pressure either by applying the tensioned portion of the polishing pad to the conditioning element or using vacuum on plenum to bias the polishing media against the conditioning element. Either way, Donohue et al. do not create pressure by applying a pressure plate to the conditioning media.

Likewise, it is submitted that Chopra et al. would not have motivated one having ordinary skill in the art to arrive at implementing a pressure plate to apply pressure to the application surface of the conditioner media of Donohue et al. First, Chopra et al. do not disclose a web-conditioner or a pressure application plate. Chopra et al. disclose a fixed table for slidably supporting the fixed abrasive pad, as the substrate is being polished and the glazed portion of the pad is being conditioned. Chopra et al. do not disclose using of a pressure plate. Chopra et al.'s implementing of a fixed table for support does not suggest or motivate one having ordinary skill in the art to use the fixed table to apply pressure to a conditioning media. In fact, Chopra et al. disclose a stationary polishing pad wherein the glazed portion of the polishing pad is conditioned subsequent to being used to polish the surface of the substrate. Chopra et al. would not have motivated one to arrive at using the fixed table to apply a conditioning media to the fixed abrasive polishing pad up stream, as defined in the claimed invention.

Therefore, the combination of the polishing magazine media of Donohue et al. and the supporting fixed table of Chopra et al. would not provide the conditioning apparatus of the claimed invention. For instance, Donohue et al. apply the tensioned polishing pad to the conditioning roller so as to create the necessary pressure while Chopra et al. do not disclose applying tension to the polishing pad. Rather, Chopra et al. use the fixed table to slidably support the polishing pad during the conditioning. As such, the fixed table cannot provide support while the tensioned polishing pad is applied to the conditioning roller. In fact, besides being a redundant component, the fixed table interferes with the application of the tensioned polishing pad to the roller and the conditioning operation of Donahue et al. polishing magazine.

Therefore, it is respectfully submitted that independent claims 1, 12, and 19 are patentable under 35 U.S.C. § 103(a) over Donahue et al. in view of Chopra et al. In a like manner, dependent claim 2-9, 11, 13-18, and 20-24 which incorporate each and every element of the respective independent claim 1, 12, and 19 are patentable under 35 U.S.C. § 103(a) over Donahue et al. in view of Chopra et al. for at least the same reasons discussed above.


Indication of Allowability:

The Applicants acknowledge the Office's comment that dependent claim 10 would be allowable if rewritten to overcome the rejections under 35 U.S.C. 112, Second paragraph and to include all of the limitations of the base claim and any intervening claims. Accordingly, claim 10 has been re-written in independent form, independent claim 25, that includes all of the limitations of the base claim and the intervening claims. Accordingly, it is submitted that claim 25, which defines another embodiment of several embodiments defined in the subject application, is in a condition for allowance.

In a like manner, the newly added independent claim 26 is directed toward a polishing pad conditioner for use in a chemical mechanical polishing (CMP) apparatus. Among others, claim 26 defines that the web dressing media and the pressure application plate are enclosed in a housing configured to rotate. As acknowledge by the Office, it is submitted that none of the cited art of record discuss implementing a conditioning web media defined in a rotating housing, as defined in claim 26. Accordingly, it is respectfully submitted that the new independent claim 26 which also depicts another embodiment of several different embodiments of the claimed invention, is patentable over the cited art of record.

In view of the foregoing, the Applicants respectfully submit that all of the pending claims are in condition for allowance. Accordingly, a Notice of Allowance is respectfully requested. If the Examiner has any questions concerning the present Amendment, the Examiner is kindly requested to contact the undersigned at (408) 749-6903. If any additional fees are due in connection with filing this Amendment, the Commissioner is also authorized to charge Deposit Account No. 50-0805 (Order No. LAM2P206). A duplicate copy of the transmittal is enclosed for this purpose.

Respectfully submitted,
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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of:

BODY et al.

Application No. 09/678,423

Filed: October 2, 2000

For: WEB-STYLE CONDITIONING SYSTEM
AND METHODS FOR IMPLEMENTING THE
SAME

Group Art Unit: 3723

Examiner: H. Shakeri

Atty. Docket No. LAM2P206

Date: July 10, 2002

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail addressed to: Commissioner for Patents, Washington, DC 20231 on July 10, 2002.

Signed: _____

Kay Harlow

MARKED-UP CLAIMS

1. (Amended) A polishing pad conditioner for use in a chemical mechanical polishing (CMP) apparatus, comprising:

a fixed abrasive polishing pad having an abrasive polishing surface;

a web dressing media having a contact surface defined between a first point and a second point, the first point being separate from the second point, wherein the web dressing media is configured to be positioned over the fixed abrasive polishing pad such that the contact surface of the web dressing media configured to be applied to the abrasive polishing surface of the fixed abrasive polishing pad; and

a pressure application plate configured to be applied against an application surface of the web dressing media that is an opposite surface to the contact surface and is defined between [the] a first position and [the] a second position.

2. (Amended) A polishing pad conditioner for use in a chemical mechanical polishing (CMP) apparatus as recited in claim 1, wherein the contact surface of the web dressing media dresses the abrasive polishing surface of the fixed abrasive polishing pad by

removing an amount of polymer matrix material from the fixed abrasive polishing pad, thereby exposing a fresh surface of fixed abrasive material.

4. (Amended) A polishing pad conditioner for use in a chemical mechanical polishing (CMP) apparatus as recited in claim 1, further comprising:

a stabilization member for controllably applying the pressure application plate to the [opposite] application surface of the web dressing media, so as to apply the web dressing media to the fixed abrasive polishing pad and cause controlled dressing.

12. (Amended) A method for conditioning a polishing pad, comprising:

providing a fixed abrasive polishing pad having an abrasive polishing surface, the fixed abrasive polishing pad configured to move between a first point and a second point, the first point being separate from the second point;

providing a web dressing media [between the first point and the second point such that] having a contact surface, the contact surface of the web dressing media [is] being defined above [an] the abrasive polishing surface of the fixed abrasive polishing pad; and

applying the contact surface of the web dressing media to the abrasive polishing surface of the fixed abrasive polishing pad so as to dress the abrasive polishing surface of the fixed abrasive polishing pad.

25. (New) A polishing pad conditioner for use in a chemical mechanical polishing (CMP) apparatus, comprising:

a fixed abrasive polishing pad having an abrasive polishing surface;

a web dressing media having a contact surface defined between a first point and a second point, the first point being separate from the second point, wherein the web dressing media is configured to be positioned over the fixed abrasive polishing pad such that the contact surface of the web dressing media is configured to be applied to the abrasive polishing surface of the fixed abrasive polishing pad;

a pressure application plate configured to be applied against an application surface of the web dressing media that is an opposite surface to the contact surface and is defined between a first position and a second position;

a feed-roll positioned above the fixed abrasive polishing pad media, the feed-roll being configured to have a supply of the web dressing media, the feed-roll is positioned at about the first point; and

a take-up roll positioned above the fixed abrasive polishing pad media, the take-up roll being configured to collect at least a linear portion of the web dressing media, the take-up roll is positioned at about the second point,

wherein the dressing media, the feed-roll, and the take-up roll define a web handling system, the web handling system being enclosed in a housing configured to rotate.

26. (New) A polishing pad conditioner for use in a chemical mechanical polishing (CMP) apparatus, comprising:

a fixed abrasive polishing pad having an abrasive polishing surface;

a web dressing media having a contact surface defined between a first point and a second point, the first point being separate from the second point, wherein the web dressing media is configured to be positioned over the fixed abrasive polishing pad such that the contact surface of the web dressing media configured to be applied to the abrasive polishing surface of the fixed abrasive polishing pad; and

a pressure application plate configured to be applied against an application surface of the web dressing media that is an opposite surface to the contact surface and is defined between a first position and a second position;

wherein the web dressing media and the pressure application plate are enclosed in a housing configured to rotate.